What is claimed is:

1. A process of manufacturing a resistance welding electrode, comprising the steps of:

compacting a powdered metal material into a desired pre-form densified compact shape,

sintering the compact shape in an inert atmosphere, and

cold forming, as required, the resultant sintered powdered metal compact shape into its final net shaped finished electrode form.

2. The product produced by the process of Claim 1.

3. The process as claimed in Claim 1, wherein said powdered metal material is dispersion strengthened copper and/or a hyper-nucleated metal matrix composite.

4. The process as claimed in Claim 3, wherein said net shape final electrode form is achieved directly in the step of compacting the powdered metal, whereby said process requires no subsequent cold forming.

5. The process as claimed in Claim 3, wherein said powdered metal is alloyed with a minor amount of a non-ferrous powder metal.

6. The process as claimed in Claim 5, wherein said non-ferrous powder metal is a copper-based welding alloy.

7. The process as claimed in Claim 6, wherein said copper-based welding alloy is selected from the group consisting of copper-chrome-zirconium, copper-zirconium, and beryllium-copper.

8. The process as claimed in Claim 1, wherein the step of compacting includes continuously applying a compressive force until a density of at least about 85% of theoretical density is achieved.

9. The process as claimed in Claim 8, wherein the compressive force is at least about 50,000 psi.

10. The process as claimed in Claim 1, wherein the step of sintering is carried out at least in part at a temperature of about 1550°F to about 1,850°F and the inert atmosphere is argon, xenon or hydrogen.

11. The process as claimed in Claim 9, wherein the step of sintering is carried out for at least about 60 minutes to about 120 minutes.

12. The electrode as claimed in Claim 11, further comprising discrete particles of a non-ferrous powder metal.

13. A method of manufacturing a resistance welding electrode, comprising the steps of:

preparing an amount of metal powder, wherein said metal powder is dispersion strengthened copper and/or a hyper-nucleated metal matrix composite,

compacting and densifying the metal powder into a pre-form having a desired shape, said compacting and densifying producing a pre-form having a density of at least 85% of theoretical density,

sintering the pre-form in an inert atmosphere, and

shaping the resultant sintered metal powder pre-form into a final net shaped finished electrode form.

14. The method as claimed in Claim 13, wherein the step of shaping includes cold forming.

15. The method as claimed in Claim 13, wherein the step of shaping includes a semi-solid molding process.

16. The method as claimed in Claim 15, wherein the semi-solid molding process comprises thixomolding.

17. The method as claimed in Claim 13, wherein

said step of preparing an amount of metal powder includes alloying a major amount of said dispersion strengthened copper and hyper-nucleated metal matrix composite with a minor amount of other elemental non-ferrous alloy powders, and

said step of sintering is carried out at a temperature sufficient to alloy said minor and major metals into said pre-form, said sintering temperature being from about 1550°F to about 1,850°F.

18. The method as claimed in Claim 15, wherein

said minor amount of other elemental non-ferrous alloy powder is selected from the group consisting of silver and in an amount sufficient to change a desired physical property of the pre-form, and

said semi-solid molding process comprises thixomolding.

19. A method of making a resistance welding electrode, comprising:

providing a supply of a suitably prepared metal powder mechanically alloyed with another metal powder to introduce a second phase, compacted and sintered into a billet,

raising the temperature of the billet to a semi-solid state to form a semi-solid slurry of nearly spherical solid particles suspended in a liquid matrix, and feeding the billet into the injection chamber of an injection molding machine, and

injecting the slurry into a preheated mold to make a final net shape or a perform shape for subsequent cold forming.

20. The method as claimed in Claim 19, wherein said suitably prepared metal powder is dispersion strengthened copper and/or hyper nucleated metal matrix composite.

21. The method as claimed in Claim 19, wherein the other metal powder being mechanically alloyed for the purpose of introducing a second phase is silver.